GRADEUP

AQA (GCSE Notes)

Chapter 4: Geometry and Measures

Q1. Draw a triangle ABC where AB = 6 cm, AC = 5 cm, and angle BAC = 60°.

Q2. Use a ruler and compass to construct the perpendicular bisector of a line segment AB of length 7 cm.

Q3. Construct a triangle XYZ where XY = 5 cm, YZ = 6 cm, and angle XYZ = 90°.

Q4. Draw two lines that are perpendicular and label the point where they meet as O.

Q5. Use a compass to bisect angle PQR where angle PQR = 80°.

Q6. Draw a regular hexagon using a compass and ruler.

Q7. Construct a perpendicular from a point C to a line AB.

Q8. Draw a line segment of 8 cm and mark a point M on it. Construct a perpendicular at point M.

Q9. Draw triangle DEF with DE = 4 cm, DF = 6 cm and angle EDF = 45°. Label all sides and angles.

Q10. Draw a square of side 5 cm. Mark all vertices clearly.

Q11. Show how to construct a line parallel to a given line L through a point P not on L.

Q12. Draw a triangle LMN with angle L = 90°, LM = 6 cm and LN = 5 cm.

Q13. Construct a triangle with sides 5 cm, 6 cm, and 7 cm. Use ruler and compass only.

Q14. Draw a line segment of 10 cm. Find and mark its midpoint.

Q15. Use a compass to construct a perpendicular to a line from a point above it.

Q16. Draw a regular pentagon and show its lines of symmetry.

Q17. Construct an equilateral triangle with each side 6 cm.

Q18. Draw two lines that intersect at a right angle and label the angle clearly.

Q19. Draw a triangle ABC with AB = 7 cm, BC = 5 cm, and angle ABC = 90°.

Q20. Construct the locus of points equidistant from points A and B where AB = 6 cm.

Q21. Draw a rectangle PQRS. Show that opposite sides are equal and angles are 90°.

Q22. Draw a triangle PQR with PR = 6 cm, QR = 4 cm, and angle PRQ = 90°.

Q23. Use ruler and compass to draw the angle bisector of a 70° angle.

Q24. Construct a triangle with two equal sides and one 60° angle.

Q25. Draw a circle with centre O and radius 5 cm. Mark a point A on the circle and draw the radius OA.

Q26. Draw two parallel lines 3 cm apart and mark a point between them.

Q27. Draw a rhombus and show that its diagonals are perpendicular.

Q28. Draw a triangle ABC with AB = 4 cm, BC = 6 cm and AC = 5 cm.

Q29. Construct a perpendicular from point P on a line to meet the line at 90°.

Q30. Draw a regular octagon and show its rotational symmetry.

Q31. Draw a triangle and label its sides a, b, c and opposite angles A, B, C.

Q32. Draw a parallelogram and show that opposite sides are equal and parallel.

Q33. Draw the locus of a point that is always 4 cm from a fixed point A.

Q34. Construct a triangle XYZ such that XY = 6 cm, YZ = 7 cm and ZX = 5 cm.

Q35. Draw a triangle ABC where AB = 5 cm, angle ABC = 60° and BC = 7 cm.

Q36. Draw a pair of lines that are parallel. Mark two points, one on each line.

Q37. Construct the angle bisector of a triangle and mark the point where it meets the opposite side.

Q38. Draw a square and draw both its diagonals.

Q39. Draw a triangle with one right angle and one side 6 cm long.

Q40. Use ruler and compass to construct the perpendicular bisector of side AB of triangle ABC.

Q41. Draw a line segment PQ = 9 cm. Mark point M such that it lies 3 cm from P.

Q42. Construct a perpendicular to a given line at one of its ends.

Q43. Draw a triangle with one angle 90° and show the perpendicular from the opposite vertex to the hypotenuse.

Q44. Draw a triangle with all angles less than 90° and label the angles.

Q45. Construct a polygon with 6 equal sides and 6 equal angles.

Q46. Draw a triangle and mark the perpendicular distance from one vertex to the opposite side.

Q47. Draw a regular triangle and show its three lines of symmetry.

Q48. Draw two lines that are perpendicular and label the right angle clearly.

Q49. Draw a triangle and construct the locus of points equidistant from two sides.

Q50. Draw a triangle and show that the shortest distance from a point to a side is the perpendicular distance.

Q51. A straight line has an angle of 120° on one side. Find the angle on the other side at the same point.

Q52. Two angles form a straight line. One angle measures 87°. Find the other angle.

Q53. Three angles meet at a point. Two of them are 135° and 95°. Find the third angle.

Q54. Two lines intersect. One of the angles formed is 48°. What is the measure of the vertically opposite angle?

Q55. Two lines intersect. One of the angles is 130°. Find all the other angles.

Q56. A pair of parallel lines is cut by a transversal. One of the alternate angles is 65°. Find the corresponding angle.

Q57. In a pair of parallel lines, one of the corresponding angles is 115°. What is the alternate angle?

Q58. Find the value of x in a triangle with angles x°, 50°, and 60°.

Q59. The angles in a triangle are in the ratio 2:3:4. Find all the angles.

Q60. One angle in a triangle is 90° and another is 37°. Find the third angle.

Q61. Find the sum of the interior angles of a pentagon.

Q62. Find the size of each interior angle in a regular octagon.

Q63. A hexagon has five angles of 120°. Find the sixth angle.

Q64. Find the sum of the exterior angles of any polygon.

Q65. Each interior angle of a regular polygon is 150°. How many sides does the polygon have?

Q66. A quadrilateral has angles of 90°, 85°, 95°. Find the fourth angle.

Q67. A kite has one angle of 110°. One of the opposite angles is 70°. Find the remaining two angles.

Q68. A parallelogram has one angle of 78°. Find the other three angles.

Q69. A trapezium has one pair of parallel sides. One angle next to a non-parallel side is 110°. Find its adjacent angle on the same side.

Q70. A rhombus has one angle of 40°. Find the remaining angles.

Q71. In a rectangle, one diagonal is drawn. What kind of triangles are formed?

Q72. A square is cut diagonally from one corner to the opposite corner. Describe the resulting triangles.

Q73. A triangle has two equal sides and the angle between them is 70°. What are the base angles?

Q74. Prove that the base angles of an isosceles triangle are equal.

Q75. Use Pythagoras' theorem to find the length of the hypotenuse of a right triangle with legs 6 cm and 8 cm.

Q76. A triangle has sides 5 cm, 12 cm, and 13 cm. Show that it is a right-angled triangle.

Q77. Show that two triangles are congruent if their sides are 6 cm, 8 cm, and 10 cm.

Q78. Two triangles have equal angles of 60°, 60°, and 60°. Are they congruent? Give a reason.

Q79. A triangle has sides 7 cm, 7 cm, and 5 cm. Show that the triangle is isosceles and find its base angles.

Q80. Two right-angled triangles have one leg of 5 cm and hypotenuse of 13 cm. Are they congruent? State the rule.

Q81. Two triangles have two equal sides and the included angle is also equal. State the congruence rule used.

Q82. Explain why all angles in a regular triangle are equal.

Q83. A quadrilateral has two pairs of equal opposite angles. Is it a parallelogram? Explain.

Q84. Prove that in a rhombus, opposite angles are equal.

Q85. Show that diagonals of a square bisect each other at right angles.

Q86. A parallelogram has diagonals intersecting at a point. Show they bisect each other.

Q87. A triangle has two sides equal and one angle 40°. Find all the angles.

Q88. Use Pythagoras' theorem to prove that a triangle with sides 9 cm, 12 cm, and 15 cm is right-angled.

Q89. In a right-angled triangle, the hypotenuse is 17 cm and one leg is 8 cm. Find the other leg.

Q90. A triangle has angles 40°, 60°, and 80°. Is it an equilateral, isosceles, or scalene triangle?

Q91. Two parallel lines are cut by a transversal and form an angle of 75°. Name and find all related angles.

Q92. A triangle is cut from a square. Prove that the triangle is right-angled and isosceles.

Q93. In triangle ABC, angle A = 90°, AB = 6 cm, AC = 8 cm. Find BC.

Q94. A quadrilateral has three angles of 100°, 85°, and 95°. Find the fourth angle.

Q95. Find the number of sides of a regular polygon if each exterior angle is 20°.

Q96. A regular polygon has 12 sides. Find the size of each interior and exterior angle.

Q97. A triangle has side lengths 6 cm, 6 cm, and 6 cm. State the type of triangle and give a reason.

Q98. A pair of vertical angles is formed by two intersecting lines. One angle is x°. Express the other angle in terms of x.

Q99. In triangle XYZ, angle X = 30°, angle Y = 80°. Find angle Z and classify the triangle.

Q100. A triangle has two angles of 70° and 40°. Is the triangle right-angled? Give a reason.

Q101. A triangle has vertices at A(1, 2), B(3, 4), and C(2, 6). Reflect the triangle in the y-axis and give the new coordinates.

Q102. A shape is translated by the vector (−3, 5). Describe the movement of each point.

Q103. A square is rotated 90° clockwise about the origin. How do the coordinates of each vertex change?

Q104. Enlarge a triangle with scale factor 2 and centre of enlargement at (0, 0). Describe the effect on side lengths.

Q105. A triangle is enlarged by a scale factor of 1/2 from the origin. What happens to its area?

Q106. Enlarge a shape with a scale factor of −2. Describe what happens to the shape and its position.

Q107. A rectangle has been reflected in the x-axis. What happens to the y-coordinates of its vertices?

Q108. Rotate a triangle 180° about the origin. Explain how the signs of coordinates change.

Q109. A triangle has been reflected in the line y = x. Describe how the coordinates of the image relate to the original.

Q110. A shape is rotated 90° anticlockwise about the origin. Give the rule for how coordinates change.

Q111. Translate a shape by the vector (4, −2) then reflect in the y-axis. Describe the final position.

Q112. Describe one transformation that maps a square onto itself.

Q113. Describe a combination of transformations that maps one congruent triangle onto another in a different position.

Q114. Describe what stays the same when a shape is reflected and then rotated.

Q115. A shape is rotated and then translated. Which properties remain unchanged?

Q116. Triangle A has vertices at (1, 1), (3, 1), (2, 4). It is reflected in the x-axis. Give the new coordinates.

Q117. Describe the difference between congruent and similar shapes.

Q118. A triangle is enlarged with a scale factor of −1. What happens to the orientation of the shape?

Q119. A shape is rotated 90° and then enlarged by scale factor 2. Describe the change in size and orientation.

Q120. A shape is enlarged by a fractional scale factor. Describe the effect on the perimeter.

Q121. Identify the centre, radius, and diameter of a circle with equation $(x - 3)^2 + (y + 2)^2 = 16$.

Q122. A chord is drawn in a circle and the radius is perpendicular to it. What does this tell you about the chord?

Q123. What is the relationship between the radius and a tangent at the point of contact?

Q124. Describe the difference between an arc and a chord in a circle.

Q125. What is a sector of a circle? Give an example in degrees.

Q126. Define a segment of a circle and describe how it is formed.

Q127. In a circle, angle at the centre is 100°. What is the angle at the circumference subtended by the same arc?

Q128. Prove that the angle in a semicircle is 90°.

Q129. A triangle is drawn inside a circle, and one of its sides is the diameter. What can be said about the triangle?

Q130. Prove that tangents from a point to a circle are equal in length.

Q131. In a circle, two chords intersect. What relationship exists between the lengths of their segments?

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Q132. In a cyclic quadrilateral, opposite angles add up to what?

Q133. A radius bisects a chord at 90°. Prove that it passes through the centre.

Q134. Describe how to construct the perpendicular bisector of a chord.

Q135. Describe how to construct a tangent to a circle from a point outside the circle.

Q136. A chord AB subtends an angle at the circumference. Describe how the angle changes as the point on the circle moves.

Q137. A triangle is inscribed in a circle and one of its angles is 90°. What does that tell you about the triangle's side?

Q138. Explain how to find the radius of a circle given the circumference.

Q139. Explain how to find the area of a sector given the radius and angle.

Q140. What is the difference between a major and a minor arc?

Q141. A circle has radius 6 cm. Find its diameter and circumference.

Q142. Prove that the angle subtended by the same arc at the circumference is constant.

Q143. In a circle, a triangle is formed with two sides as radii. What kind of triangle is it?

Q144. In a circle, a chord is drawn parallel to the diameter. What can be said about the angles subtended by the chord?

Q145. What is the name of the quadrilateral formed by joining four points on a circle?

Q146. What happens to the size of an angle at the circumference as the point moves closer to the arc?

Q147. Describe how to find the centre of a circle using only a compass and ruler.

Q148. What is the length of an arc that subtends an angle of 60° in a circle of radius 5 cm?

Q149. A tangent meets a radius at the point of contact. What angle do they make?

Q150. A cyclic quadrilateral has one angle of 110°. What is the opposite angle?

Q151. A triangle has vertices A(2, 3), B(6, 3), and C(4, 7). Find its area using the coordinate formula.

Q152. A line segment joins points (1, 2) and (5, 6). Find the length of the line segment.

Q153. A rectangle has vertices at (0, 0), (0, 4), (6, 4), and (6, 0). Find its perimeter.

Q154. Find the midpoint of the line joining the points (3, 7) and (9, 1).

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Q155. Find the gradient of the line passing through the points (2, 5) and (6, 1).

Q156. A square has a vertex at the origin and side length 5. Find the coordinates of all its vertices.

Q157. A cuboid has dimensions 5 cm, 3 cm, and 2 cm. Find its volume.

Q158. A cylinder has radius 4 cm and height 10 cm. Find its volume.

Q159. A triangular prism has a triangular base with area 12 cm² and height 8 cm. Find the volume of the prism.

Q160. A cone has a radius of 3 cm and height of 4 cm. Find its volume.

Q161. A sphere has radius 6 cm. Find its surface area.

Q162. A pyramid has a square base with side 6 cm and vertical height 10 cm. Find its volume.

Q163. A composite solid is made of a cone on top of a cylinder. Both have radius 5 cm. The cone is 7 cm high and the cylinder is 10 cm high. Find the total volume.

Q164. A right prism has a pentagonal base with area 20 cm² and height 15 cm. Find its volume.

Q165. A cube has surface area 150 cm². Find the length of one edge.

Q166. A rectangular tank has dimensions 2 m, 1.5 m, and 1 m. Find the capacity in litres.

Q167. A trapezium has parallel sides of 8 cm and 5 cm and height of 4 cm. Find its area.

Q168. A circle has a diameter of 10 cm. Find its circumference.

Q169. A circle has area 154 cm². Find the radius.

Q170. A composite shape consists of a rectangle and a semicircle on one side. The rectangle is 10 cm by 4 cm, and the semicircle has diameter 10 cm. Find the total area.

Q171. A square-based pyramid has a slant height of 10 cm and base side 6 cm. Find its surface area.

Q172. A solid hemisphere has radius 5 cm. Find its volume.

Q173. A cone and a hemisphere have the same radius of 3 cm. The cone's height is 6 cm. Find the total volume of the solid.

Q174. A garden has the shape of a sector with radius 12 m and angle 90°. Find its area.

Q175. A map has a scale of 1:5000. On the map, a road is 12 cm long. What is the actual length?

Q176. A path is shown on a map with a bearing of 045°. What direction does it represent?

Q177. Two towns are 5 cm apart on a 1:100000 scale map. Find the real distance in kilometres.

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Q178. A triangle has sides 9 cm, 12 cm, and 15 cm. Find its area using Heron's formula.

Q179. A sector has radius 7 cm and angle 60°. Find the arc length.

Q180. A water tank is a cylinder of radius 1 m and height 2 m. Find its volume in litres.

Q181. A circular track has radius 30 m. How far does someone run if they complete 2 full laps?

Q182. A cone has slant height 13 cm and radius 5 cm. Find its surface area.

Q183. A rectangular prism has surface area 94 cm². Its length is 5 cm, width 2 cm. Find the height.

Q184. A pyramid has volume 120 cm³ and base area 40 cm². Find its height.

Q185. A triangle on a coordinate grid has points A(2, 1), B(5, 1), and C(3, 4). Find its area.

Q186. The height of a cylinder is doubled. How does its volume change?

Q187. A cuboid has volume 240 cm³ and base area 30 cm². Find its height.

Q188. A square has area 49 cm². Find its perimeter.

Q189. A metal pipe is a hollow cylinder with external radius 6 cm, internal radius 4 cm, and length 10 cm. Find its volume.

Q190. A cone fits exactly inside a cylinder of the same radius and height. Compare their volumes.

Q191. A prism has volume 180 cm³ and height 6 cm. Find the area of the base.

Q192. A sphere has surface area 314 cm². Find its radius.

Q193. A room is 5 m long, 4 m wide and 3 m high. Find its volume.

Q194. A square pyramid has a base side of 10 cm and slant height of 13 cm. Find its surface area.

Q195. A tin can has height 12 cm and diameter 6 cm. Find its surface area including top and bottom.

Q196. A composite shape is made of a cone (height 9 cm) on top of a cylinder (height 15 cm), both with radius 4 cm. Find total height and volume.

Q197. A right prism has trapezium base with parallel sides 6 cm and 10 cm, height 5 cm, and prism height 12 cm. Find the volume.

Q198. A cone has volume 150 cm³ and height 10 cm. Find its radius.

Q199. A sector has an arc length of 12.56 cm and radius 4 cm. Find the angle of the sector.

Q200. A cuboid has length 7 cm, width 4 cm and height 3 cm. Find its surface area.

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Q201. A sector of a circle has a radius of 10 cm and angle 60°. Find the arc length of the sector.

Q202. A circle has radius 12 cm. Calculate the area of a sector with a central angle of 150°.

Q203. The arc length of a sector is 5.24 cm and the radius is 4 cm. Find the angle of the sector.

Q204. A sector has an area of 38.48 cm² and radius 7 cm. Find the angle of the sector.

Q205. Two circles are similar. The radius of the smaller is 5 cm and the larger is 10 cm. If the smaller has area 78.5 cm², find the area of the larger.

Q206. Two similar cubes have volumes 27 cm³ and 125 cm³. Find the ratio of their surface areas.

Q207. A right-angled triangle has legs of length 6 cm and 8 cm. Use Pythagoras' theorem to find the hypotenuse.

Q208. In a triangle, one angle is 90°, the hypotenuse is 13 cm, and one leg is 5 cm. Find the other leg.

Q209. A triangle has angle θ = 30° and the opposite side is 6 cm. Find the hypotenuse.

Q210. A right-angled triangle has an adjacent side of 7 cm and angle θ = 45°. Find the hypotenuse using trigonometry.

Q211. Use trigonometry to find the length of the side opposite an angle of 60°, given the hypotenuse is 10 cm.

Q212. A triangle has sides 7 cm and 10 cm enclosing an angle of 40°. Find the area of the triangle.

Q213. In triangle ABC, side a = 9 cm, side b = 7 cm, and angle C = 60°. Use the cosine rule to find side c.

Q214. In triangle ABC, angle A = 45°, side a = 10 cm, side b = 12 cm. Use the sine rule to find angle B.

Q215. A right-angled triangle has sides of length 5 cm and 12 cm. Find all angles using trigonometric ratios.

Q216. Find the height of a triangle if one side is 15 cm and the angle opposite the height is 30°.

Q217. A 3D pyramid has a slant edge of 10 cm and base length 6 cm. Use trigonometry to find its vertical height.

Q218. A cone has a slant height of 13 cm and base radius of 5 cm. Find the vertical height using Pythagoras' theorem.

Q219. A ramp is 4 m long and rises 1.5 m. Find the angle of elevation.

Q220. A ladder leans against a wall, forming an angle of 60° with the ground. If the ladder is 10 m long, how high does it reach up the wall?

Q221. Calculate the exact value of sin 30°.

Q222. Write down the exact value of cos 60° and tan 45°.

Q223. Prove that in a right-angled triangle with angles 30°, 60°, and 90°, the sides are in the ratio 1:√3:2.

Q224. Triangle ABC has sides AB = 7 cm, AC = 9 cm, and angle B = 75°. Use the sine rule to find angle C.

Q225. Triangle ABC has sides a = 11 cm, b = 8 cm, and angle C = 100°. Find the length of side c.

Q226. Use the cosine rule to find the angle between sides of length 6 cm and 8 cm, given the opposite side is 10 cm.

Q227. Use the sine rule to find the missing angle in a triangle with sides 8 cm, 10 cm, and an angle of 40° opposite the 8 cm side.

Q228. A triangle has sides 7 cm and 9 cm with an included angle of 50°. Find the area.

Q229. Describe the translation that moves point A(3, 2) to point B(7, 5) as a vector.

Q230. Add the vectors $\mathbf{a} = (2, -1)$ and $\mathbf{b} = (-3, 4)$.

Q231. Subtract the vector $\mathbf{b} = (4, -2)$ from $\mathbf{a} = (1, 3)$.

Q232. Multiply the vector $\mathbf{v} = (3, -2)$ by the scalar −2.

Q233. A vector $\mathbf{u} = (5, 1)$ represents a movement. Describe this movement in terms of translation.

Q234. Triangle ABC is translated by vector (−2, 4). Write the new coordinates of point A(1, 3).

Q235. Given that vector $\mathbf{a} = (1, 2)$ and $\mathbf{b} = (-1, 3)$, find the vector $2\mathbf{a} + \mathbf{b}$.

Q236. A triangle is enlarged by a scale factor of 3. If one side was 5 cm, what is its new length?

Q237. A cone has radius 3 cm and height 4 cm. A similar cone has a height of 12 cm. Find its radius.

Q238. Two similar spheres have radii in the ratio 2:5. Find the ratio of their surface areas.

Q239. The volumes of two similar pyramids are in the ratio 1:8. What is the ratio of their heights?

Q240. Two similar cylinders have heights in the ratio 3:5. Find the ratio of their volumes.

Q241. A solid cuboid is enlarged by a scale factor of 2. By what factor do its volume and surface area change?

Q242. Use a vector diagram to prove that the diagonals of a parallelogram bisect each other.

Q243. Prove using vectors that the medians of a triangle meet at a single point.

Q244. Use vectors to show that the line joining the midpoints of two sides of a triangle is parallel to the third side.

Q245. Given points A(1, 2) and B(4, 6), express vector **AB** in column form.

Q246. A vector **a** = (3, 4). Find its magnitude.

Q247. Two similar triangles have corresponding side lengths in the ratio 2:3. What is the ratio of their areas?

Q248. In triangle XYZ, side XY = 5 cm, YZ = 7 cm, and angle X = 60°. Find angle Z using the sine rule.

Q249. A regular hexagon is inscribed in a circle of radius 6 cm. Find the area of one of the sectors formed.

Q250. A sector has radius 8 cm and angle θ. If the arc length is 10.5 cm, find θ in degrees.